

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
4 August 2005 (04.08.2005)

PCT

(10) International Publication Number
WO 2005/070836 A1

(51) International Patent Classification⁷: **C02F 1/461**

(21) International Application Number:
PCT/US2004/042961

(22) International Filing Date:
20 December 2004 (20.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/535,209 9 January 2004 (09.01.2004) US

(71) Applicants and

(72) Inventors: **CLARKE, Robert, Lewis** [US/US]; 74 Muth Drive, Orinda, CA 94563 (US). **HARRISON, Stephen** [GB/US]; 134 Panorama Drive, Benicia, CA 94510 (US). **JAIN, Salil** [IN/US]; 36314 Larado Drive, Fremont, CA 94536 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

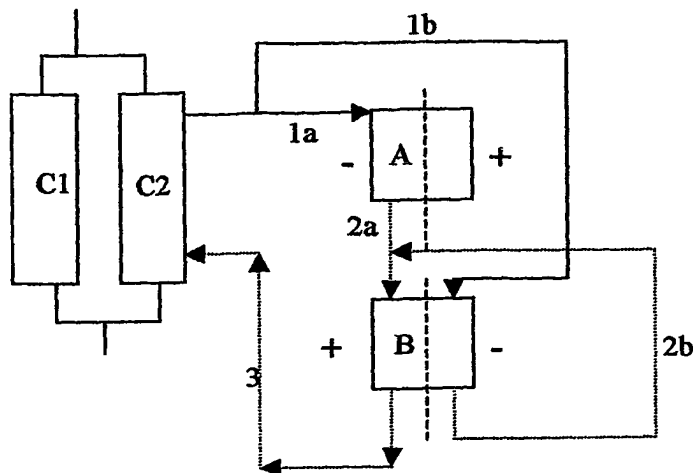
— of inventorship (Rule 4.17(iv)) for US only

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ELECTROCHEMICAL NITRATE DESTRUCTION



(57) Abstract: Devices and methods are presented for removal and destruction of nitrate from water using an ion exchange medium from which the nitrate is eluted using brine, and in which the so generated eluent is sequentially reduced and oxidized in distinct compartments to form nitrogen from nitrate and ammonia, respectively. In especially preferred devices and methods, the reduced and oxidized eluent is re-reduced to electrochemically destroy hypohalites formed during oxidation. Among other advantages, contemplated devices and methods allow nitrate destruction with minimal concomitant production of nitrite and hypohalites.

WO 2005/070836 A1